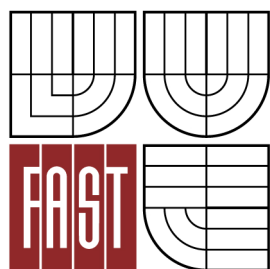




VYSOKÉ UČENÍ TECHNICKÉ V BRNĚ

BRNO UNIVERSITY OF TECHNOLOGY



**FAKULTA STAVEBNÍ
ÚSTAV POZEMNÍHO STAVITELSTVÍ**

FACULTY OF CIVIL ENGINEERING

INSTITUTE OF BUILDING STRUCTURES

"FIT BODY" SPORTING CENTRE

SPORTOVNÍ CENTRUM "FIT BODY"

DIPLOMOVÁ PRÁCE

MASTER'S THESIS

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BRNO 2014



VYSOKÉ UČENÍ TECHNICKÉ V BRNĚ FAKULTA STAVEBNÍ

| | |
|--------------------------------|---|
| Studijní program | N3607 Civil Engineering |
| Typ studijního programu | Navazující magisterský studijní program s výukou v anglickém jazyce s přesněnou formou studia |
| Studijní obor | 3608T001 Pozemní stavby |
| Pracoviště | Ústav pozemního stavitelství |

ZADÁNÍ DIPLOMOVÉ PRÁCE

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|--|------------------------------|
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| Název | "Fit Body" Sporting Centre |
| Vedoucí diplomové práce | Ing. František Vajkay, Ph.D. |
| Datum zadání diplomové práce | 31. 3. 2013 |
| Datum odevzdání diplomové práce | 17. 1. 2014 |
| V Brně dne 31. 3. 2013 | |

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Studie dispozičního řešení stavby, katalogy a odborná literatura, Zákon č. 350/2012, kterým se mění zákon č. 183/2006 Sb. (Stavební zákon), Stavební zákon č. 183/2006 Sb., Vyhláška č. 499/2006 Sb., Vyhláška 268/2009 Sb., Vyhláška 398/2009 Sb., platné ČSN, směrnice děkana č. 19/2011 a dodatky

Zásady pro vypracování

Zadání VŠKP: Projektová dokumentace stavební části k provedení novostavby sportovního centra. Cíl práce: vyřešení dispozice pro daný účel, návrh vhodné konstrukční soustavy, nosného systému a vypracování výkresové dokumentace včetně textové části a příloh podle pokynů vedoucího práce. Textová i výkresová část bude zpracována s využitím výpočetní techniky. Výkresy budou opatřeny jednotným popisovým polem a k obhajobě budou předloženy složené do desek z tvrdého papíru potažených černým plátnem s předepsaným popisem se zlatým písmem. Dílčí složky formátu A4 budou opatřeny popisovým polem s uvedením seznamu příloh na vnitřní straně složky.

Požadované výstupy dle uvedené Směrnice:

Textová část VŠKP bude obsahovat kromě ostatních položek také položku h) Úvod (popis námětu na zadání VŠKP), položku i) Vlastní text práce (projektová dokumentace – bod F -Technická zpráva dle vyhlášky č. 499/2006 Sb.) a položku j) Závěr (zhodnocení obsahu VŠKP, soulad se zadáním, změny oproti původní studii).

Příloha textové části VŠKP v případě, že diplomovou práci tvoří konstruktivní projekt, bude povinná a bude obsahovat výkresy pro provedení stavby (technická situace, základy, půdorysy řešených podlaží, konstrukce zastřešení, svislé řezy, pohledy, detaily, výkresy sestavy dílců popř. výkresy tvaru stropní konstrukce, specifikace, tabulky skladeb konstrukcí – rozsah určí vedoucí práce), zprávu požární bezpečnosti, stavebně fyzikální posouzení stavebních konstrukcí včetně zadané specializované části. O zpracování specializované části bude rozhodnuto vedoucím DP v průběhu práce studenta na zadaném tématu.

Předepsané přílohy

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Ing. František Vajkay, Ph.D.
Vedoucí diplomové práce

Abstrakt

Diplomová práce zpracovává dokumentaci pro realizaci novostavby multifunkčního sportovního centra. Objekt je navržen jako dvoupodlažní s vnějším zateplovacím systémem ETICS. Objekt je navržen dle požadavků příslušných právních předpisů. Objekt splňuje hodnoty nízkoenergetického standartu. Budova je nepodsklepená s plochou jednoplášťovou střechou. Nosné konstrukce stropů tvoří panely SPIROL. Nosná konstrukce střechy haly je tvořena plnostěnných lepených nosníků a dřevěných vaznic se zavětrováním.

Klíčová slova

diplomová práce, sportovní, centrum, sportovní centrum, hala, sportovní hala, fitness, nízkoenergetický objekt, samostatně stojící, zděná stavba, zděný objekt, plochá střecha, plnostěnný lepený nosník, lepený nosník, ETICS, předpjaté stropní panely SPIROL

Abstract

Master thesis processes documentation for the realization of the new building of the multi-functional sporting centre. Object is designed as the two storey building with the external thermal insulation system ETICS. Object is designed according to the appropriate legislation. Object fulfills demands for the low-energy standard. Building is without cellar with the flat warm roof. Load bearing constructions of the floor ceilings are made out of prestressed concrete panels SPIROL. Load bearing construction of the hall roof is made of the glulam timber beams and purlins with the bracing.

Keywords

master thesis, sports, centre, sporting centre, hall, sports hall, fitness, low-energy building, standalone, masonry building, masonry object, flat roof, glulam timber beam, glulam beam, ETICS, prestressed concrete panels SPIROL

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Bibliografická citace VŠKP

Bc. Vít Janíček *"Fit Body" Sporting Centre*. Brno, 2014. 24 s., 372 s. příl. Diplomová práce.
Vysoké učení technické v Brně, Fakulta stavební, Ústav pozemního stavitelství. Vedoucí práce Ing.
František Vajkay, Ph.D..

Prohlášení:

Prohlašuji, že jsem diplomovou práci zpracoval(a) samostatně a že jsem uvedl(a) všechny použité informační zdroje.

V Brně dne 14.1.2014

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podpis autora
Bc. Vít Janíček

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V Brně dne 14.1.2014

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Poděkování:

Tímto bych rád poděkoval především Ing. Františku Vajkayovi PhD. za vedení mé diplomové práce, rodině za projevenou podporu při studiu na Fakultě stavební a kolegům ze studijní skupiny CA2NPS1, kteří mě podporovali při psaní diplomové práce svým entusiasmem.

V Brně dne 14.1.2014

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Úvod

Tato diplomová práce je zaměřena na návrh multifunkčního sportovního centra pro širokou veřejnost. Vybraný konstrukční systém je zděná budova s vnějším zateplovacím systémem ETICS. Nosná konstrukce stropů fitnessu je tvořena předpjatými stropními panely SPIROL. Střecha haly bude tvořena systémem obloukových plnostěnných lepených nosníků spojených vaznicemi spolu se zavětrováním. Zakládání budovy bude provedeno formou základových pasů z železobetonu. Konstrukce budovy budou navrženy vzhledem k potřebám nízkoenergetických staveb. Celá budova bude vytápěna dvěma jednotkami HVAC umístěnými na ploché střeše fitnessu.

Pro potřeby diplomové práce byla zvolena parcela v severní části města Ivančice, 30 km JZ od Brna. Dotčené parcely jsou v lehce svažitém terénu. Celá lokalita je situována v oblasti s převládajícími štěrky a štěrkopísky dobře ulehlými. Budova má lehké základové podmínky. Lokalita není vystavena technické seismicitě a nenachází se v oblasti poddolované ani v záplavovém území.

Jako diplomová práce bude vyhotoven prováděcí projekt zamýšlené budovy podle veřejné vyhlášky č. 499/2006 Sb. s ohledem na změny k 28.2. 2013.

Introduction

This master thesis is focused on the design of the multi-functional sporting centre aimed for the wide public. Chosen construction system is masonry building with the external thermal insulation system ETICS. Load bearing construction of the ceilings in fitness will be made of the pre-stressed concrete panels SPIROL. Hall roof will be made of the system of arched glulam timber beams and purlins with bracing. Foundation of the building will be done in the form of the foundation strips from the reinforced concrete. Constructions of the building will be designed according to the demands on the low-energy building performance. Whole building will be heated by the HVAC units placed on the warm roof of the fitness.

For the purpose of the master thesis project was chosen parcel in the northern part of the town Ivančice, 30 km SW of Brno city. Touched parcels are in the slightly sloped terrain. Whole locality is situated to the area with the prevailing well compacted gravels and gravel sands. Building has easy founding conditions. Locality is not affected by the technical seismicity and is not located in the undermined or flooding area.

As the master thesis will be done executive project for the intended building according to the public notice No. 499/2006 Coll. with respect to the changes from 28th February 2013.

A Accompanying report

A.1 Identification data

A.1.1 Building object data

- a) "Fit Body" Sporting centre, new building
- b) Cadastral area Ivančice, touched parcels no. 900/1, 900/36, 900/37, 900/38, 900/39, 915/4 and 915/1

A.2 List of the input documents

- b) Technical documentation was processed on the basis of the task of the Master thesis on the Brno University of Technology, Faculty of Civil Engineering.
- c) Further documents were: Preliminary study of the object, demand on the process of the preliminary design of the multifunctional sports facility in the town Ivančice, submitted by the municipal office in Ivančice.

A.3 Areal data

- a) The whole area of the intended areal is located in the north part of the town Ivančice on the parcels that are currently used as the areas for agricultural crops growing at the edge of the built up area. Before the process of this degree of technical documentation was permitted exclusion from the land fund. Whole area was bought out by the investor. Total area of the parcel is 16 871,463 m².
- b) Intended parcel is not located in the area with the special demands on the protection zones. In the area is not historical reservation or zone, specially protected area, flooded area nor undermined area.
- c) Intended parcel is located in the slightly sloped area with the prevailing of the gravels and gravel sands. Rain water from the paved areas in this area will be drained by the drainages to the combined sewerage system and from the other (green) areas will be drained by the natural drainage of the soil.
- d) Intended building is in the correspondence with the local areal planning documentation. Areal decision for the building of the sporting centre was claimed in 10/2013.
- e) Areal plan in this area counting with the building of the multifunctional sports facility with respect to the usage by the wide public. Further possible development of the external playgrounds and such is also part of the areal planning.
- f) Area fulfils the common demands on the recreational usage of the area for the sports. During the planning were fulfilled all minimal distances from the surrounding buildings.
- g) During the building process of the building will be fulfilled all demands of the touched organs, especially narrowing of the international optic data cable as demanded by the data connection provider.
- h) With the intended building are not connected any reliever solutions.
- i) Demanding investment for building of the sporting centre will be necessary buy out of the whole area and change of the owner of the area before the beginning of the construction process. This demand was fulfilled by the investor even before the process of the documentation with respect to the agreement with the municipal office in Ivančice.
- j) Touched parcels by the construction are: 3112/3 – owner town Ivančice, Palackého náměstí 196/6, 664 91 Ivančice; rest of the parcel 900/1 – Agricultural land fund.

A.4 Building data

- a) New building
- b) Recreational and sports activities for the wide public, renting of the sports facilities and solution of the business plan of the investor.
- c) Permanent structure
- d) Building is not part of the cultural heritage of the Czech republic and is not connected with such building in any way. Building is not fulfilling any other demands of other legislation for the necessity of protection.
- e) Building is not designed primarily as the barrier free facility. In the case of need entrance to the building will be provided with the ramp for the persons with wheelchair access restrictions. Door sills will be provided with the haunches or will be sunken to the floor cover layer.
- f) Building has no demands to be fulfilled with respect to the touched organs with respect to the other legislation acts.
- g) Building has no exceptions or reliever solutions.

h) *Built up area:* 2 899,89 m²

New usable area: 3 337,42 m²

Built up volume: 40 075,58 m³

Division to the functional units: whole building will be divided into four functional units –

Main lobby and auditorium; dressing rooms and showers of sportsmen; sports hall with tool rooms; fitness.

Size of the functional units is evident from the drawings of the first and second underground floor.

No. of personal/max. possible visitors with respect to functional units:

- Main Lobby and auditorium: 4/250
- Dressing rooms and showers of sportsmen: 0/80
- Sports hall with tool rooms: 0/330
- Fitness: 10/120

- i) *Building will be connected to the following connections:* electricity, water main, optic data cable and combined public sewerage.

Types of the wastes will be same as for the buildings for housing. No danger or special type of waste will be produced. Rain water will be drained according to the situational drawing partially to the combined sewerage system and partially by the natural drainage.

Hot water will be prepared in the technical room by the electrical boiler with 1,0 m³ with possibility of turbo-heating. Hot water distribution in the object will be established by the piping in the suspended ceiling.

Heating of the building and ventilation will be provided by 2 independent HVAC units. One will be placed on the roof construction of the sportsmen dressing room, that will supply heated air to the sports hall and dressing rooms. Second unit will be placed on the top of the 2 storey part of the fitness building and will supply fitness and lobby part of the building. Units will be provided with high efficiency heat recuperation and combined power of the units will be at least 54,42 kW for the heating.

- j) Probable date of the construction start: 04/2014
- Ground adjustments and subsoil improving: 06/2014
- Beginning of the building erection: 07/2014
- End of the construction: 09/2015

k) Expected expenses on building*:

| | |
|--|--------------|
| Whole expenses: | 30 035 800,- |
| Whole project expenses: | 2 703 200,- |
| Executive project: | 756 900,- |
| Permission project: | 702 900,- |
| Land use decesion: | 297 400,- |
| Performance of the authorial and building supervision: | 594 700,- |

*According to the valid fee system of the ČKAIT as the base for the contract price between employer and contractor. All prices are in CZK.

A.5 Division of the building on objects, technical and technological equipment

Building is not divided on the partial objects. In the building there are no technological equipment. Technical room of the building will be in the first floor according to the drawings of the floor plans.

B Summary technical report

B.1 Description of the building area

- a) Parcel is located at the north part of the town Ivančice at the edge of the built up area, 30 km SW of city Brno. Terrain in the area is in the slight slope in SW direction. At the present time the parcel is used for the cultivation of the agricultural crops.
- b) Intended parcel is located in the area of the prevailing well dense gravels and gravel sands with minimal compressive strength 250 kPa, determined from the past testing. Underground water in the area is fluctuating in between depths from 12 to 15 m under the current level of the terrain. In the area there is no place of the historical or architectural significance.
- c) In the area there is located protection perimeter of the international optic cable link that will not be affected or trespassed by the building intentions. There are no other protection perimeters.
- d) Parcel is not located in the flooding or undermined area or historical zone.
- e) Building has no influence on the surrounding buildings or parcels. Drainage conditions of the area will not be influenced. Excessive rain water will be drained to the combined public sewerage.
- f) In current state there is no need of redevelopment or demolition of the buildings in the area because of the intended building process, on the parcel there are no structures of the building character. There is no long-lasting vegetation in the area so there is no need for the tree felling.
- g) Whole parcel was already excluded from the agricultural land fund and there is no need for the annexation of the surrounding areas.
- h) In the locality there are all connections needed for the connection of the intended building. Connection to the transport and technical infrastructure will be provided by the approach from the crossing of the streets Na Úvoze and Zemědělská.
- i) At the current stage of the planning there are no time or tangible connections of the building and no conditioning, caused by or related investments.

B.2 Complete description of the building

B.2.1 Purpose of the building usage and basic capacities of the functional units

Building is intended for the solution of the business plan of the investor as the centre for the sports activities of the wide public.

No. of personal/max. possible visitors with respect to functional units:

| | |
|--|--------|
| – Main Lobby and auditorium: | 4/250 |
| – Dressing rooms and showers of sportsmen: | 0/80 |
| – Sports hall with tool rooms: | 0/330 |
| – Fitness: | 10/120 |

B.2.2 Overall urban and architectural solution

- a) Urbanism – Building is in correspondence with the territorial control. Composition of the spatial solution counts with the rectangular floor plan with the north-south orientation. Building will consist of two interconnected parts of hall and fitness where hall will be done with the rounded flat roof with the highest point of the attic +17,545 m ($\pm 0,000 = 250,315$ m

a.s.l in Bpv.) and fitness part will consist of two storeys and highest point of the fitness attic will be +12,530 m.

- b) Architectonical solution – Whole building will be on the floor plan of the notched rectangular. South part will be one storey with the flat roof with maximal height +6,470 m. Western part will two storey with the flat roof with maximal height +12,530 m. Construction height of the 1st OF will be 6,080 m and the construction height of the 2nd OF will be 5,830 m. Hall itself will be with the rounded roof construction with the height +17,370 m at the highest point of the roof (or +17,545 m with attic). All windows of the whole building will be done with rounded horizontal parts according to the drawings of the elements – windows. Hall will be provided with two facade windows from the columns-transoms load bearing system. Building is made of masonry from the precise ceramic blocks HELUZ with external insulation system ETICS from the EPS. Building is stiffened by the reinforced concrete ring beams. Longitudinal halls are protected against buckling by the usage of the additional use of masonry pillars. Horizontal constructions of the floor ceilings are made of the pre-stressed concrete panels SPIROLL with the thickness 400 mm (265 mm respectively according to the drawings). Roof of the hall is build of the glulam beams 1540x200 mm that are covered by the plasterboard suspended ceiling. Colour solution will be consisting of the colour stripes and checkered areas according to the drawings of the preliminary study.

B.2.3 Overall operational solution, technology of the fabrication

In the building will be used HVAC system for the heating, cooling and ventilation. For the heating of the hot water will be used electric boiler with the reservoir and possibility of the turbo-heating.

B.2.4 Barrier-free use of the building

Building was not primarily designed for the barrier free usage but with respect to the demands on the use by the wheel-chair access persons will be entrance stairs provided with the special ramp for the wheel-chair access. Door sills will be done with the notches and/or as sunken sills in order to allow free move.

B.2.5 Safety during the usage of the building

No internal constructions are designed in such way that they may cause injury or death during the normal usage. Safety of the people in the 2nd OF lobby will be provided by the metal fencing (2,95 – 3,00 m height). People using flat roof must have safety harness to be able to connect to the safety wires around the edge of the building.

B.2.6 Basic characteristic of the objects

- a) Building will be solved as the masonry building with ETICS thermal insulation. Whole building will be consisting of the two storey fitness centre and hall. Whole building is stiffened by the ring beams that are located at the top end of the each floor.
- b) Whole building is made out of the precise ceramic brick blocks HELUZ (both load-bearing masonry and partitions). External walls will be provided with the thermal insulation system ETICS EPS (masonry th. 300 – 150 mm of EPS, masonry th. 240 – 220 mm EPS). Floor constructions will be made of the SPIROLL pre-stressed concrete panels (400 mm and 265 mm respectively). Hall roof is made out of the system of glulam curved beams and longitudinal timber purlins and bracing, Insulated by the EPS.

- c) No constructions are designed in a way that there may occur any excessive deformations and or failure of the structure.

B.2.7 Basic characteristics of the technical and technological equipment

- a) In the building there will be no technological equipment or equipment. Air-conditioning in the building will be guided hidden in the suspended ceiling same as the guidance of the hot water.
- b) Air-conditioning and heating will consist of two HVAC units with the combined power at least 54,5 kW. Heating of the hot water will be provided by the electric boiled with turbo-heating and 1,0 m³ reservoir.

B.2.8 Fire safety report

Fire safety report containing parts a – j of this paragraph is added separately at the end of this report together with the drawing of the fire distances and designation of the fire hydrant(s).

B.2.9 Principles of the energetic management

- a) Criteria for the thermal technique evaluation will be taken from the Czech national standard ČSN 73 0540 – 2: Demands. Thermal evaluation is done in the form of the comparison with the referential building and categorising of the results according to the evaluation scale of the energy label. Selected locality for the determination Ivančice (-15°C). Weighted average of the internal winter temperature (in the terms of air volume) 18°C.
- b) Energetic demands on the heating are 54,5 kW, i.e. 19,6 kW/m²a (fulfils low energy standard building) and is categorised as the category A – Very economical.
- c) Use of the solar and geothermal energy is possible. Due to the orientation of the building it is possible to install solar collectors for the additional heating of the hot water and/or photovoltaic panels for the possible additional supply of the electricity. Also is possible to use heat pump earth-air.

B.2.10 Hygienic demands on the buildings, demands on the working and communal environment

Ventilation will be provided in the summer season by the windows and/or in case of need by HVAC unit with cooling section. In winter season will be ventilation (and heating) provided only by the HVAC units with heating section and with recuperation of the heat (efficiency at least 75%+).

Light in the hall will be provided mainly by the large-format facade windows in combination with the ceiling lights for the evening day period. Light in the other parts of the building will be provided by the windows and by the artificial lighting. It is also possible to use light guides but the project primarily does not count with them and they will be considered during the process of the erection of the building.

Object will be supplied with the potable water from the existing water main by the newly established water supply connection DN 75.

Waste from the services will be putted to the container for the communal waste and none of this will have character of the danger waste according to the environment. Waste waters will be drained to the combined public sewerage system.

By the building process and by the usage of the building will not occur new sources of the waste, noise, vibrations or dust pollutions).

B.2.11 Protection of the building from the negative effects of the exterior environment

- a) Protection against the radon leakage from the subsoil will be sufficient designed water proofing from the 2 layers of the SBS modified bituminous felts. Radon radiation has 2nd degree – medium radiation.
- b) Protection from the stray currents will be provided for the engineering networks by the usage of the polarized drainage.
- c) In the location there are no possible sources of the technical seismicity.
- d) Design of the external constructions provides sufficient protection from the noise.
- e) Locality is not situated in the flooding area on the top of the hill plane so there is no danger of flooding.

B.3 Connection to the technical infrastructure

- a) Building will be connected to the networks on the crossing of the streets Na Úvoze and Zemědělská.
- b) Connection dimensions and lengths are visible in the situation drawing.

B.4 Traffic solution

- a) Traffic solution will consist of the building of the asphalt approach from the street Na Úvoze and establishment of new parking places for the sports centre. After the Closing hour of the centre, parking will be usable by the inhabitants of the housing estate.
- b) Connection of the building to the current traffic infrastructure will be provided by the new approach as it is described in paragraph a).
- c) On the paved area in front of the sports centre will be established new parking places for the Visitors of the sports centre. After the closing hour of the centre there will be possibility of use of the parking places for the inhabitants of the housing estate.
- d) In the area there are no walking and biking trails.

B.5 Solution of the vegetation and the related terrain adjustments

- a) Before the self building process will be removed and deposited 15 cm of the topsoil from the whole parcel. After that will follow the narrowing of the terrain surface to the level -0,315 m (250,000 m a.s.l in Bpv.). All soil will be compacted to the strength of the original subsoil. Slopes that occur because of the terrain adjustments will be secured by the use of the self grassing concrete tiles.
- b) As used vegetation elements are used self grassing concrete tiles on the slopes, and grass field behind the sporting centre. Where grass field will be used after the self construction of the building will be used as the place for the outdoor playgrounds.
- c) In locality are not demanded additional biotechnical solutions.

B.6 Description of the building influences on the environment and its protection

- a) By the construction and usage of the building there will be no pollution or harm of the air, underground water and/or subsoil and will not occur any noise pollution.
- b) In the area are no protected trees, commemorative trees or any demands on the protection of the plants and animals. Ecological bonds in the landscape will be preserved.
- c) Building has no connections on the complex of the protected areas Natura 2000.

- d) Screening procedures did not find any violation that are against the protection of the environment.
- e) For the intention building there are no proposals for the new protection zones.

B.7 Protection of the people

Building has no public demands on the fulfilling of the tasks for the protection of the people during the armed conflict.

Building can be used as the shelter for people in case of the natural disaster.

B.8 Principles of the construction organization

- a) Investor ensure all media and material in the sufficient amount during the whole process of the building work. Water will be provided from the temporary water connection to the water main which will be modified to the permanent connection after the finishing of the building works.
- b) During the construction will be building site dewatered by the natural drainage. After the finishing of the asphalt pavement in front of the building will be this area dewatered to the combined public sewerage.
- c) Building site will be connect to the current technical infrastructure by means of the temporary connection places. Connection to the traffic infrastructure will be provided by the unpaved approach which will be after the construction end paved and used as the new connection to the traffic infrastructure.
- d) Building process will have no influence on the surrounding areas by any means.
- e) Whole building site will be protected by the wire fence with the temporary gate in the place of the approach. On the building site are no demands on redevelopment, demolitions or tree felling.
- f) For the building site there will be no need of the temporary or permanent annexation.
- g) Building process must be done according to the lowest possible amount of the waste. All waste materials from the building site will be placed and disposed in containers with respect to the character of the waste material (recyclable, non-recyclable, flammable, etc.).
- h) All excessive soil from the excavation works will be used for the purpose of the level adjustment of the terrain around the building itself. On the building site will not occur permanent heaps of the excavated soil and temporary will be disposed immediately. Additional soil will be provided by the town Ivančice from the town soil heaps.
- i) By the building process will not be harmed environment in any way. All possible contaminations will be prevented by the safety precautions for the handling with the possible danger materials (handling with cement, cement contaminated water etc.).
- j) Health and safety precautions will be provided according to the law 309/2006 Coll. About further demands on health and safety precautions during the working process and according to the Government regulation 61/2007 Coll. About health and safety precautions determination with changes 68/2010 Coll. and 93/2012 Coll.; it is mainly aimed to the work in the excavations, in heights, in the protective zones of the heavy machinery; work with the rotating and electric-driven tools and especially on the usage of the protective gear.
- k) Building process will not affect any surrounding buildings and there is no demand on the barrier-free usage provision.

- l) Building process on the intended parcel has no time or material connections to the surrounding parcels and no engineering traffic solutions are needed.
- m) There are no special conditions on the building process in the traffic. All masonry constructions will be protected against the rain water inlet before the finishing of the floor erection. All other building works will be made according to the precise technological procedure for the given material or construction.
- n) Probable date of the construction start: 04/2014
Ground adjustments and subsoil improving: 06/2014
Beginning of the building erection: 07/2014
End of the construction: 09/2015

Závěr

Jako diplomová práce byl vyhotoven projekt multifunkčního sportovního centra v severní části města Ivančice. Zamýšlená stavba byla navržena s ohledem na co nejjednodušší dispozici a tepelně technické posouzení. Předběžný výpočet ukázal, že přibližná tepelná ztráta celého objektu bude 54,5 kW. Návrh klade důraz na jednoduchost, ale současně také na funkčnost užívání a jisté architektonické ozvláštnění. Celá budova byla navržena ze zdících prvků HELUZ a předpjatých stropních panelů SPIROL. V objektu není řešen systém vytápění, ale předběžný návrh počítá s využitím dvou jednotek HVAC se 75% rekuperací tepla o celkovém výkonu 54,5kW. Bez uvažované rekuperace se objekt dostává do kategorie nízkoenergetických domů podle ČSN 73 0540-2 s energií pro vytápění přibližně 19,5 kWh/m².a. Po odečtení rekuperace se energie pro vytápění snižuje na přibližně 4,91 kWh/ m².a. Bez dalších výpočtů a po zahrnutí dalších energetických příjmů a ztrát nelze objekt bezpečně zařadit do kategorie pasivních nebo nulových domů.

Conclusion

For the master thesis was made executive project of the multi-functional sporting centre located to the northern part of the town Ivančice. Intended building was designed with respect to the easiest possible disposition and thermal design. Preliminary calculation of the energy label showed that the thermal loss of the whole object is about 54,5 kW. Design emphasis on the simplicity but together with it also on the functionality of the usage and certain architectural tangents. Whole building is designed from the masonry ceramic blocks HELUZ and pre-stressed concrete panels SPIROL. In the object the heating is not further designed but preliminary design counts with the usage of two HVAC units with at least 75% recuperation and combined power 54,5 kW. Without recuperation is the object in the category of the low-energy houses according to ČSN 73 0540-2 with the energy consumption approximately 19,5 kWh/m².a. After the subtraction of the returned energy from the recuperation the energy for the heating is about 4,91 kWh/m².a. Without further calculations and inclusion of the other energy gains and losses the object can not be safely classified as the passive or zero house category.

Seznam zdrojů (List of sources):

Zákon č. 183/2006 Sb., o územním plánování a stavebním řádu (stavební zákon);
Vyhláška č. 499/2006 Sb., o dokumentaci staveb;
Vyhláška č. 268/2009 Sb., o technických požadavcích na stavby;
Vyhláška č. 501/2006 Sb., o obecných požadavcích na využívání území;
Nařízení vlády č. 361/2007 Sb., kterým se stanoví podmínky ochrany zdraví při práci;
Zákon č. 309/2006 Sb., o zajištění dalších podmínek bezpečnosti a ochrany zdraví při práci;
ČSN 01 3420 Výkresy pozemních staveb – Kreslení výkresů stavební části;
ČSN EN ISO 128-23 Typy čar a jejich použití;
ČSN 01 3130 – Technické výkresy – Kótování – Základní ustanovení;
ČSN 73 0540 Tepelná ochrana budov;
ČSN 73 0532 Akustika – Ochrana proti hluku v budovách a posuzování akustických vlastností stavebních výrobků – Požadavky;
Appendix Fire safety report with drawings
www.heluz.cz – Oficiální webové stránky produktu Heluz
www.prefa.cz – Oficiální webové stránky produktu SPIROL
nahlizenidokn.cuzk.cz – Nahlížení do katastru nemovitostí

Seznam použitých zkratek a symbolů (List of the used abbreviations and symbols)

Sb., Coll. – odkaz na sbírku zákonů ČR;

OF – over-ground floor – nadzemní podlaží (ekvivalent zkratky NP);

ČKAIT – Česká komora autorizovaných inženýrů a techniků činných ve výstavbě;

CZK – Czech crown – Česká koruna;

U – U-value – součinitel prostupu tepla vícevrstvou konstrukcí;

m, m², m³, kN, kPa, kW – jednotky SI (SI units)

List of attachments

B. Study

- a. Documents of the designing process

C. Technical documentation

- a) Accompanying report
- b) Summary technical report
- c) Situation
- d) Documentation of the building (object/s)
 - 1. Architectonical and construction technical solution
 - 2. Building constructional part
 - 3. Fire safety report
- e) Evidence part
- f) Appendixes:
 - 1. D.1.3 – A – Technical report
 - 2. D.1.3 – B – Drawings of the fire distances and fire sectors division
 - 3. Thermal design and energy label of the building
 - 4. Technical drawings

Přílohy (Attachments)

See folders B and C.